Skeletal Muscle Contractile And Fatigue Properties In Smoking Mice, [Publication Page: A2456]

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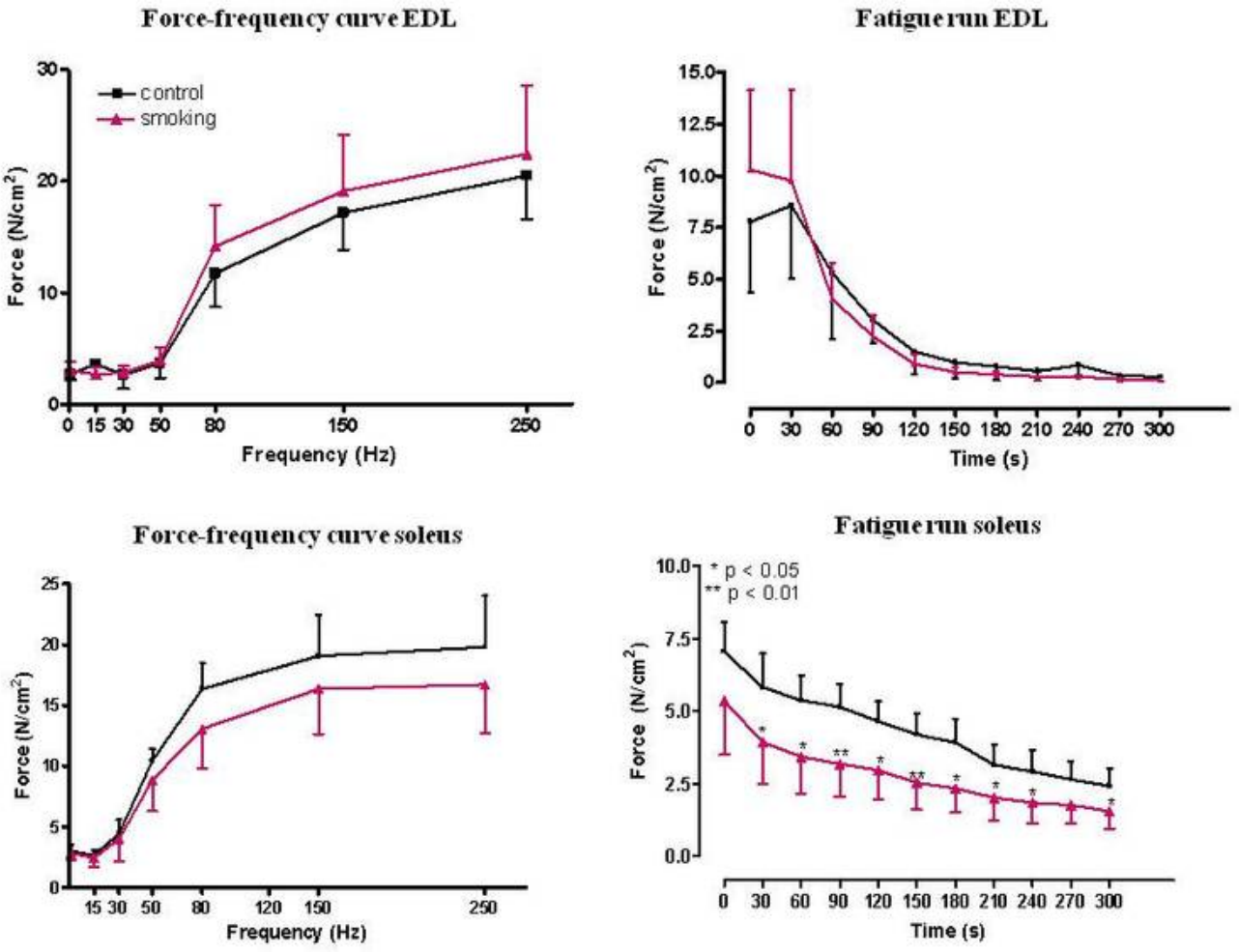
Introduction: Chronic obstructive pulmonary disease has been associated with muscle weakness. At present, it is unclear whether muscle weakness is caused by the disease itself or by associated factors such as disuse. The aim of our study was to examine whether muscle dysfunction would develop in a smoke induced emphysema mouse model.

Methods: Male C57Bl/6 mice of 8 weeks old (n = 35) were daily exposed to smoke/air during 3 and 6 months with nose-only exposure system (Scireq). Lung function measurements, bronchoalveolar lavage, histology of the lungs as well as muscle mass and contractile properties of two peripheral muscles (soleus and extensor digitorum longus) were assessed at 3 and 6 months. An unpaired student t-test was performed to determine differences between groups (Graph Pad).

Results:, After 3 and 6 months of smoke exposure, hyperinflation of the lungs was present with a significantly increased TLC (32 % vs. 37 %) and significantly increased compliance (26% vs. 35 %) Mean linear intercept also significantly increased after 6 months smoking (14 %, p = 0.01). Histology revealed lymphocyte infiltrates around the small airways at 3 months which further increased after 6 months. Although the body weight increase was significantly less after 6 months in the smoking groups, the total muscle mass of the two peripheral muscles was not different from the controls. Contractile properties and fatigability of the extensor digitorum longus muscle were similar after smoking (Figure). By contrast, the force generated by the soleus muscle during the force-frequency curve tended to be lower at high stimulation frequencies after 6 months of smoke exposure (20 % decrease at 80 Hz, p value = 0.086) (Figure). In addition, force during the low frequency fatigue run was significantly decreased in soleus (p = 0.015) (Figure).

Conclusion: Our results demonstrate that smoke induced emphysema with nose-only exposure induced muscle dysfunction but only in type I soleus muscle. This effect develops with disease progression.

Contractile properties and fatigue run of the extensor digitorum longus (EDL) and the soleus muscle. Values are means and standard deviation



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